



DBAR-HIMAC : High Mountain and Cold Regions Data Aspects

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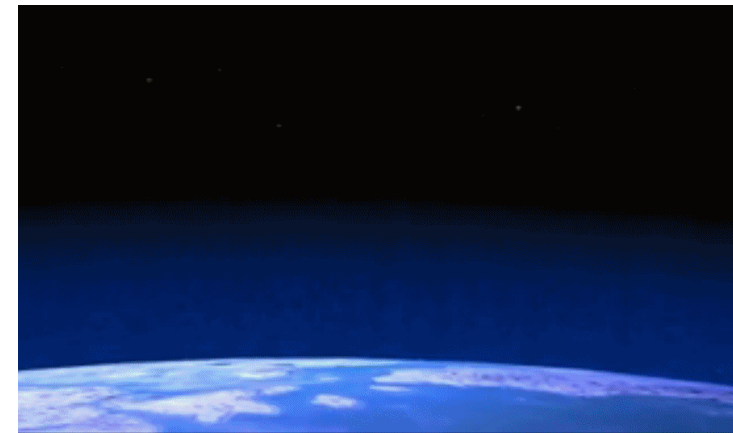
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A Living Blue Planet for Human Kind

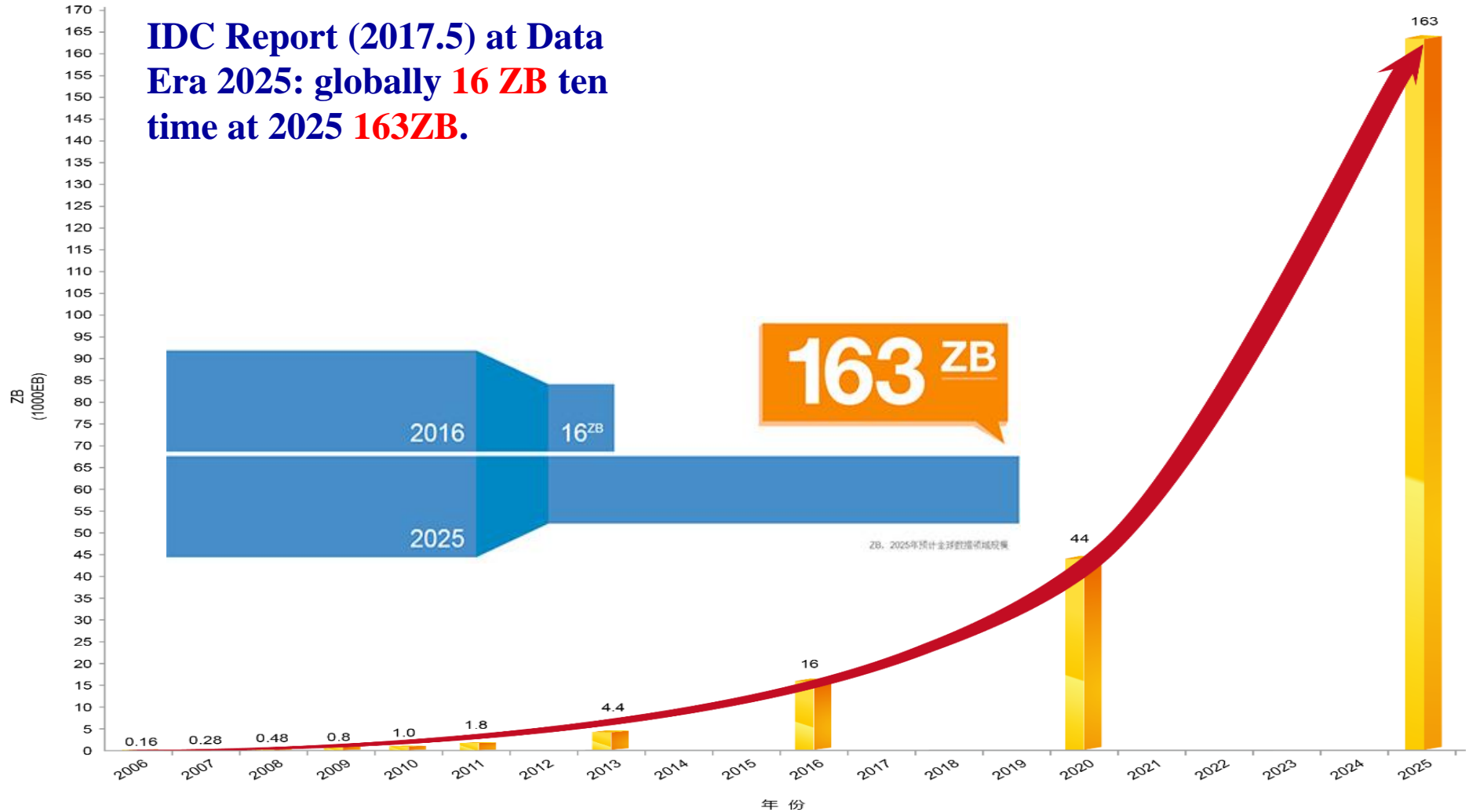
Human Activities



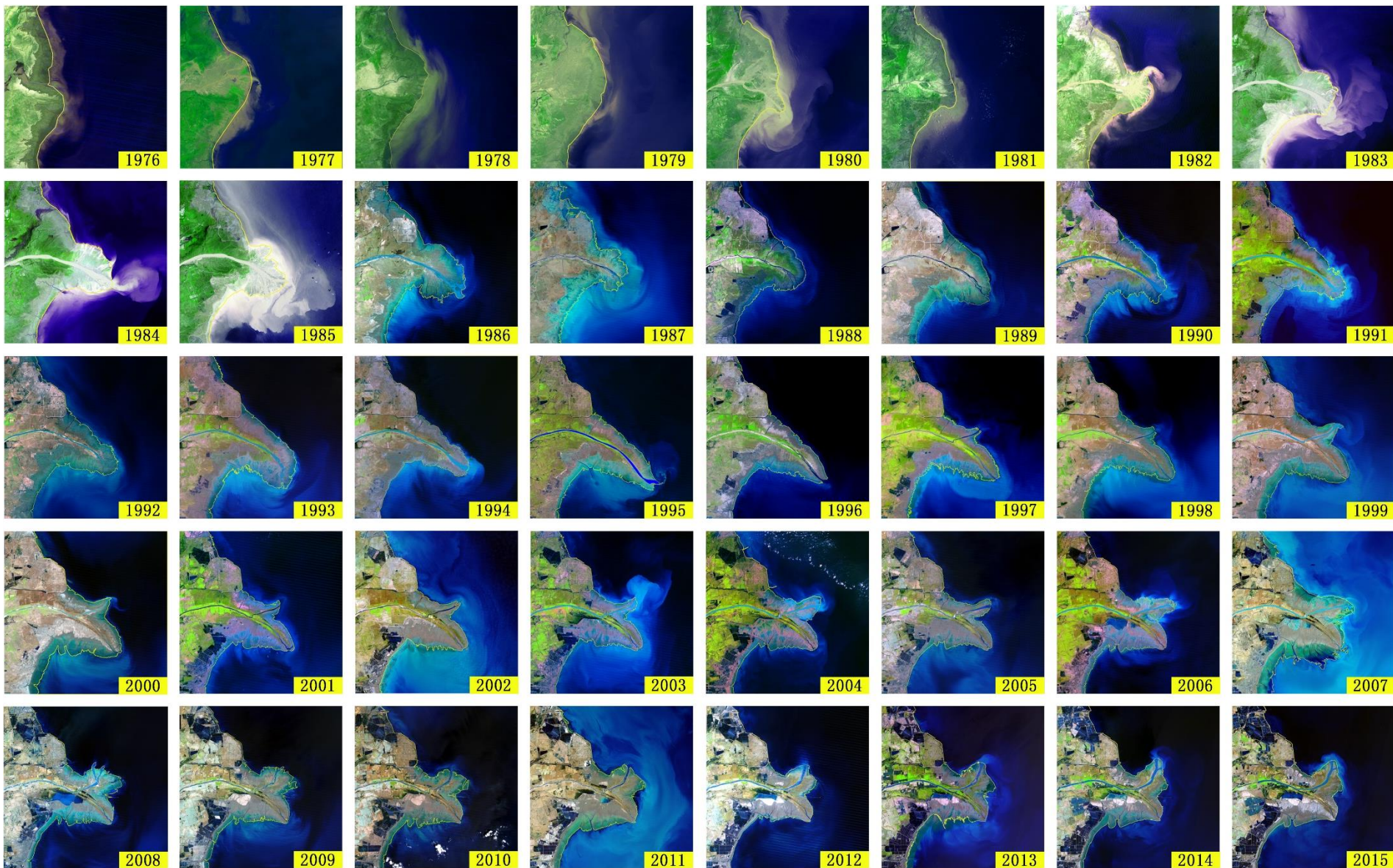
A breathing Earth

Accelerating Big Data Era

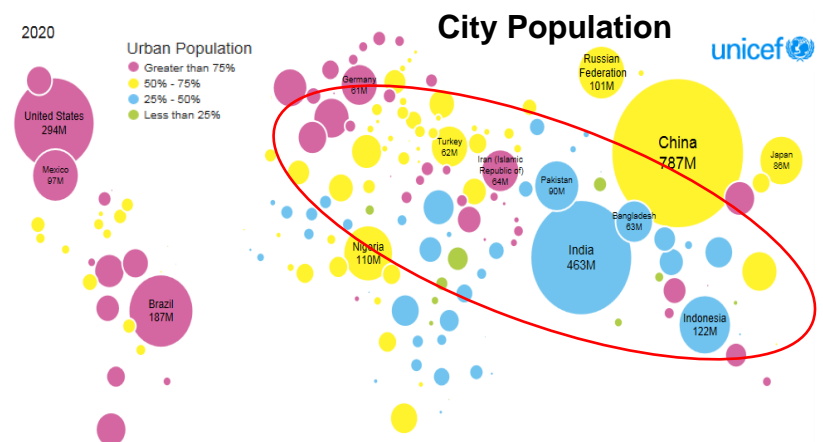
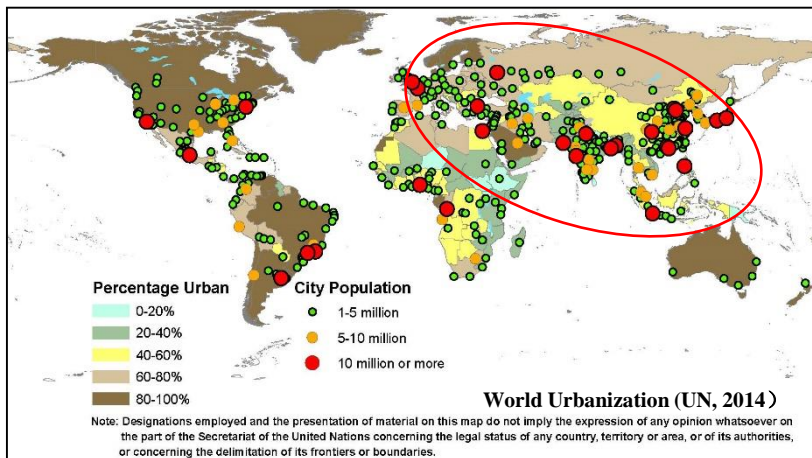
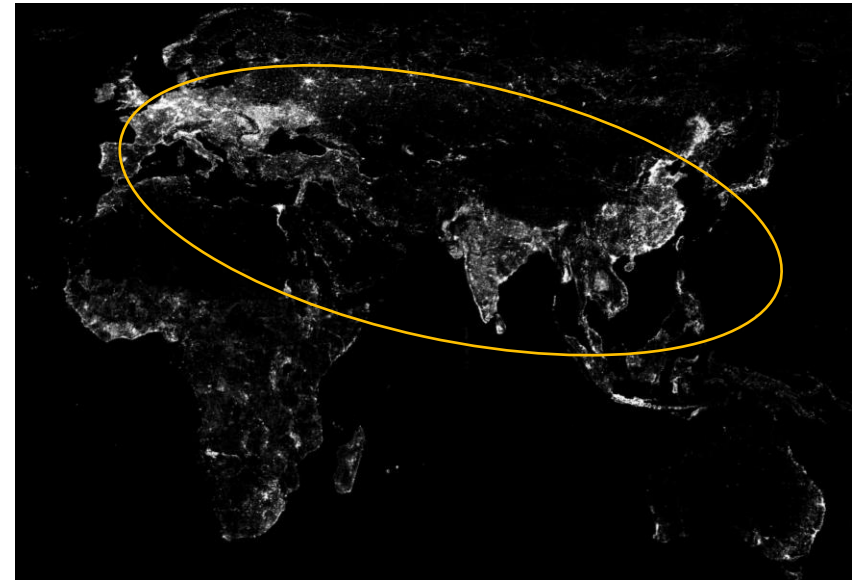
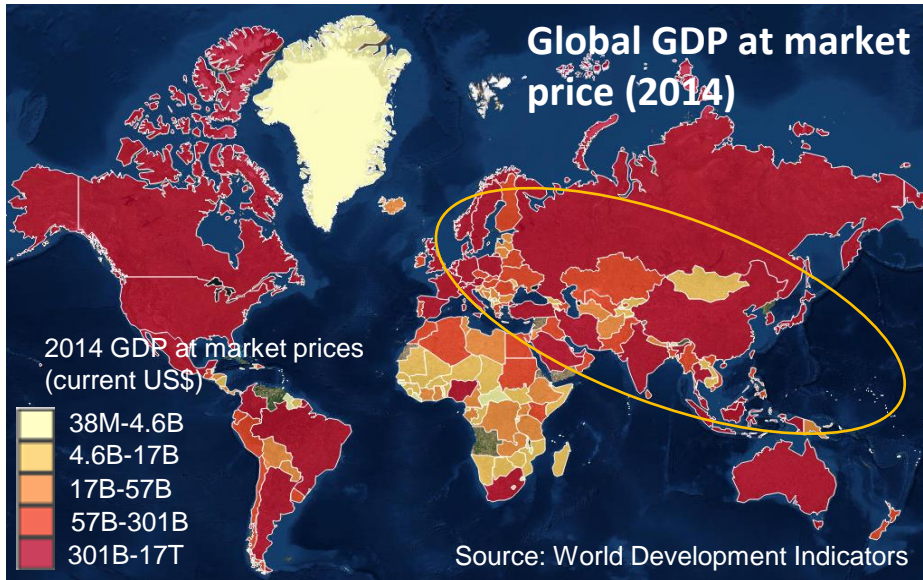
IDC Report (2017.5) at Data Era 2025: globally **16 ZB** ten time at 2025 **163ZB**.



Dramatically Earth planet changing– an example of 40s' Yellow Delta Evolution



Data runs into the details of the Environment and Human activities, not only tell the truth, also provide the solutions and decision makers for the future.



China's Earth Observation Data



Meteorological Satellites

FY-1 series: polar orbit satellites; FY-2 series: stationary orbit satellites; FY-3 series: polar orbit satellites



Resource Satellites

CBERS series: developed jointly by China and Brazil; ZY3-01/02: surveying, mapping and resource investigation.



Ocean Satellites

HY-1A/B: ocean color satellites; HY-2A: ocean dynamics and environment satellite.



Environment and Disaster Reduction Satellites:

HJ-1A/B: optical sensors; HJ-1C: S-band SAR sensor.



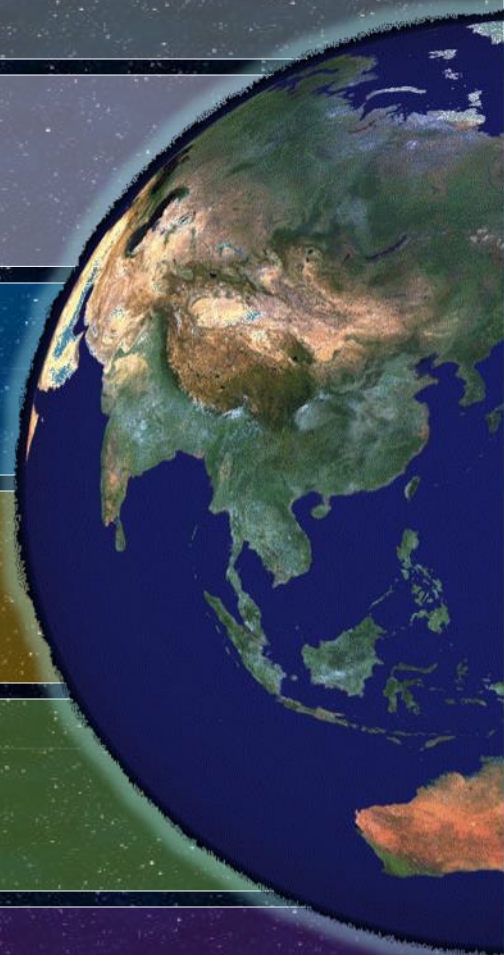
High Resolution Satellites

GF series: construction period: 2010-2020; including optical and SAR satellites.

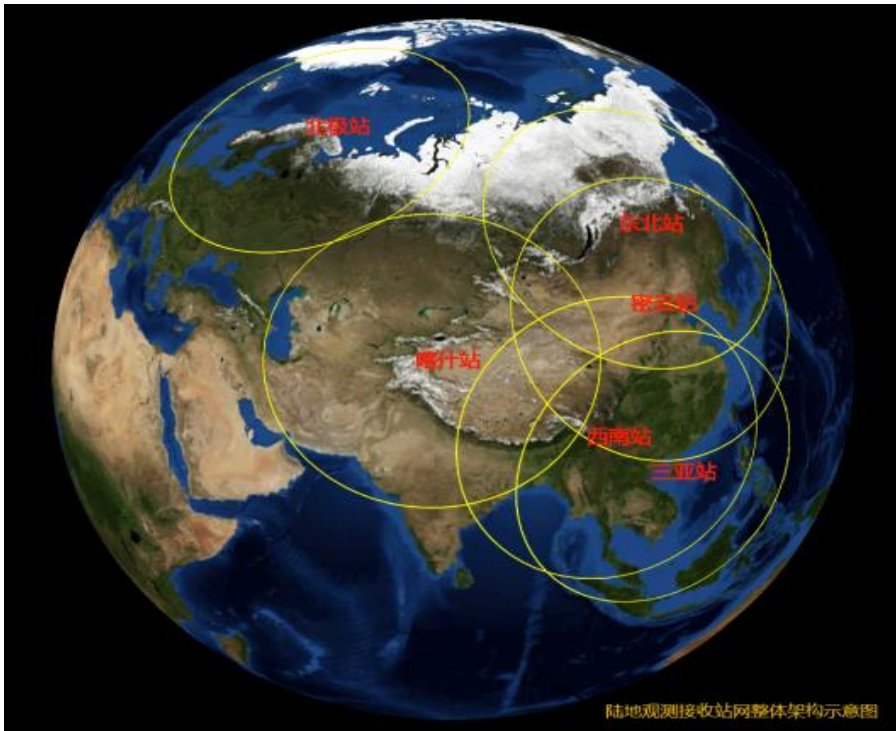


BeiDou Navigation and Positioning Satellites

BeiDou series: including 35 satellites, networked operation; global coverage.



EO Satellite Ground Stations



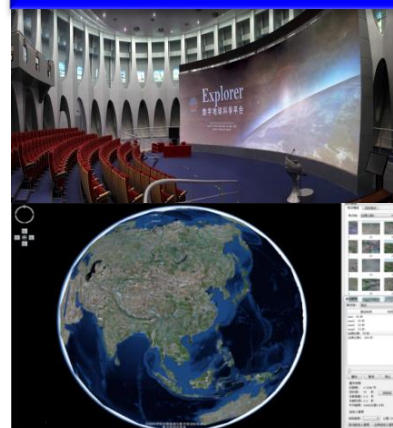
Big Earth Observation Data in RAD1

- **250TB** - Archived Data
 - More than **300GB** acquired by 3 ground stations per day
- **2** more ground stations will be built
 - Launch more than **10** remote sensing satellites with high-resolution sensors in the next 5 years

RAD1's Ground Stations



DE Scientific Platform



- The big Earth data resources are about **38PB**, and **8,000 million records**
 - **Earth observation data**: ~ 12PB
 - **Biology** (biodiversity, biological resources, etc.): ~22PB
 - **Ecology** (ecosystem monitoring, assessment, investigation, etc.) : ~ 3PB
 - **Resources and environment** (atmosphere, soil, fresh water, ocean, etc.) : ~ 1PB

- New data is expected to exceed 10PB over the next 5 years
 - Earth observation satellite raw data: increasing **2.5 TB daily**.

Big Earth Data Science Engineering Project

- ❑ A Project of the **Strategic Priority Research Program (SPRP)** of CAS, which focus on **Big Earth Data** study.
- ❑ Oriented toward **technological problems** concerning overall and long-term development resolving major scientific problems.



- ❑ A strategic action plan that integrates technical problem-solving with **team- and platform-building**.
- ❑ Provide a new impetus for **interdisciplinary, cross-scale, macro-scientific discoveries** using big Earth data.



A New Journal

BIG EARTH

Data

VOLUME 1

ISSUES 1-2

DECEMBER 2017

PRINT ISSN: 2096-4471

ONLINE ISSN: 2574-5417

CN 10 - 1455/P

地球大数据(英文)

创刊号 简本



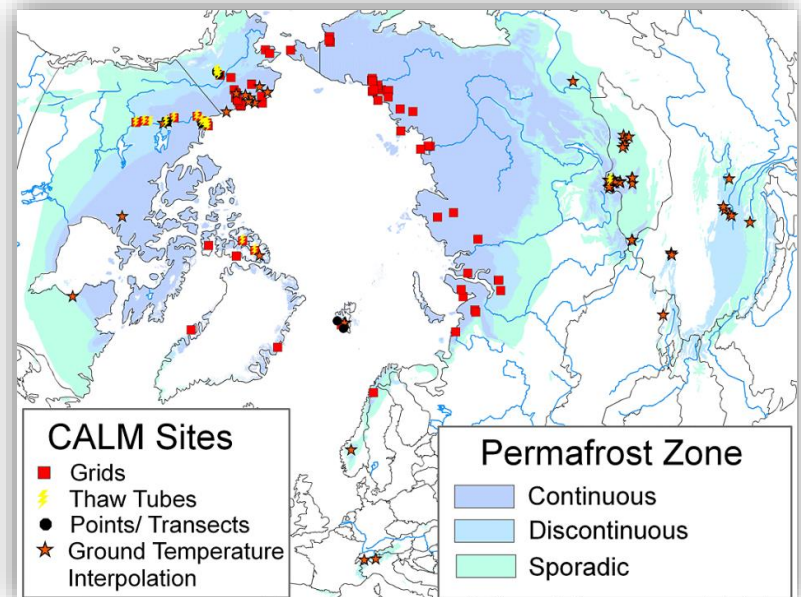
DBAR-HiMAC Position in DBAR Program





Look at the Earth from a different angle :
the Earth Poles connected closely.

- ◆ Cold Regions: are the most important environment that driven the Earth system and the Earth planet.
- ◆ Frozen Water and Phase changing Domination Role :
 - High Latitude ;High Altitude



DBAR-HiMAC Task Force

Under the auspices of DBAR, the Task Force on High Mountain and Cold Regions (HiMAC) was established to address the challenges through **collaborations with the national and international programs and initiatives.**



Members of DBAR-HiMAC
Task Force



DBAR-HiMAC focuses on science objectives to build a **HiMAC Big Earth Data** component by linking the **existing Earth observations, archiving and documenting Earth observation data and geophysical products**, producing knowledge and services.

Collaborations



**Advisor Board
and Contributors**

- Within GEOCRI
- Within GEO
- With other organizations and networks

*GEO-GNOME
GEOGLOWS
...*

- INTAROS (Arctic Observations)
- iCUPE (Arctic Environment Monitoring)
- KEPLER(Key Environmental monitoring for Polar Latitudes)
- MARIS(INTAROS- Arctic Information Services)
- ...



*IEEE Ad Hoc Committee
on North & South Poles*

**Arctic Data
Committee (ADC)**

SCARDM

POLDER



*HiMAC2017(China)
HiMAC2018(Finland)*

**Polar Data
Committees**

Recent Activities of DBAR-HiMAC



- The 2017 International Workshop on Observations and Understanding of Changes in High Mountain and Cold Regions (HiMAC2017) was held in Beijing, China on 3-4th, March, 2017



- DBAR HiMAC Work Meeting on 4th, March, 2017
- Collaboration with GEO CRI



- DBAR HiMAC White Paper: DBAR-HiMAC Publication – Position Paper in CAS Bulletin

HiMAC2018 @ FMI-ASC, Finland

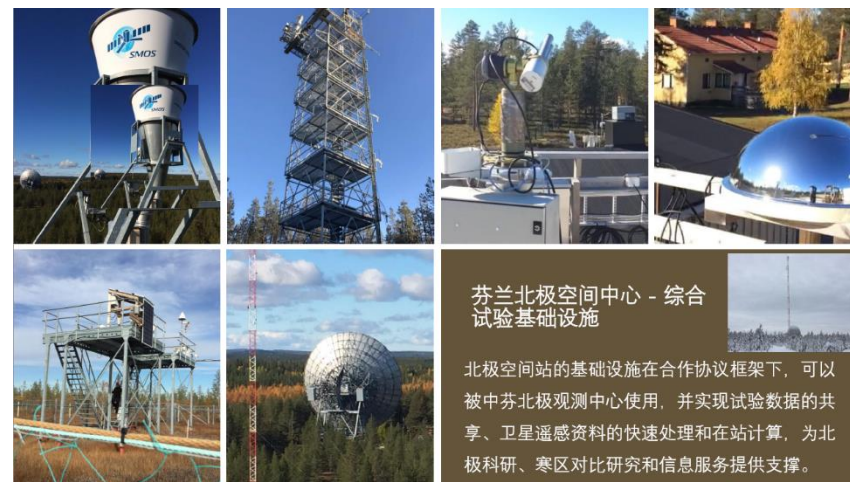
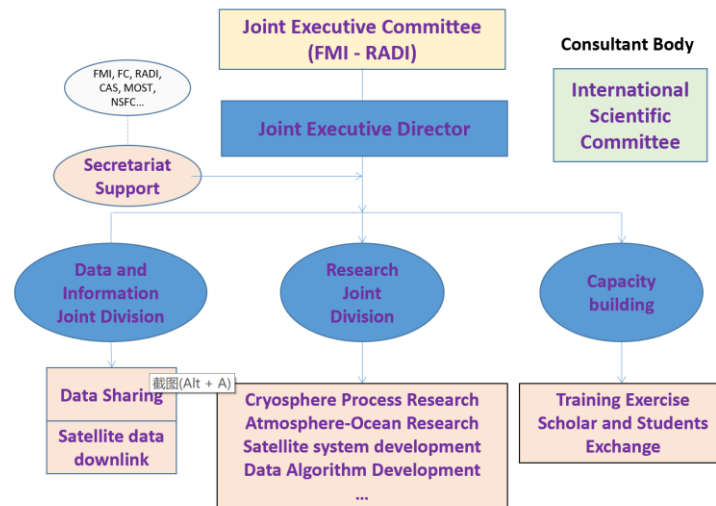


HiMAC2018 Workshop in Oct., 29-30, 2018

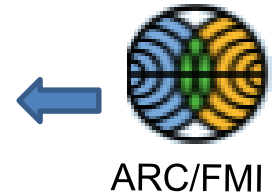
- Hosted by FMI-Arctic Research Center
- DBAR-HiMAC Task Force effort
- Inauguration of FMI-AIR Joint Research Center for Arctic Observations
- Six Sessions including international program, EU big projects, data ecosystem, essential variables, products, in-situ experiment, satellite systems, and earth science application, and adaption to societal benefits.

FMI-AIR Joint Research Center for Arctic Observations

Joint Research Unit Collaboration Structure



Partnership with FMI ARC (Sondakyla station)

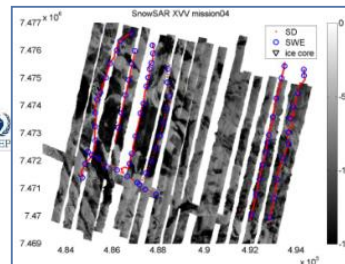


ARC/FMI



■ FMI E0 Data Center

- ✓ AOI Sentinel 1/2/3
- ✓ Sentinel 1 NRT ;
- ✓ Chinese Dataset from GF and others



- GF2 Optical Remote Sensing Data (cloudy normally)
- Chinese GF3 SAR Data overseas



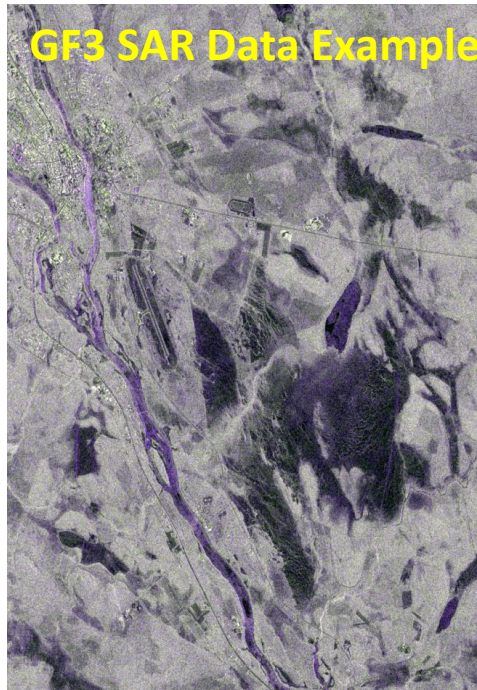
GF2 Data Pan 0.8m



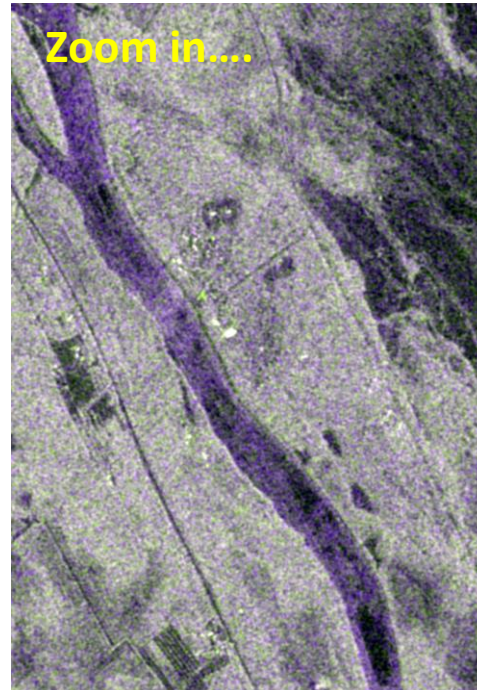
GF2 Multi-Band 3.2m



GF3 SAR Data Example



Zoom in....



MOST Projects contribute to the HiMAC

国家重点研发计划政府间重点专项 中欧政府间合作项目（空间）

北极环境多要素空间观测与信息服务研究 Multi-Parameters Arctic Environmental Observations and Information Services (MARIS)

汇报人：邱玉宝

主持单位：中国科学院遥感与数字地球研究所 (RADI-CAS)

参与单位：国家海洋环境预报中心 (NMEFC)

中国极地研究中心 (PRIC)

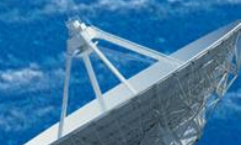
合作项目：EU-H2020北极综合观测系统 (INTATOS)

合作单位：挪威南森环境与遥感中心 (NERSC)

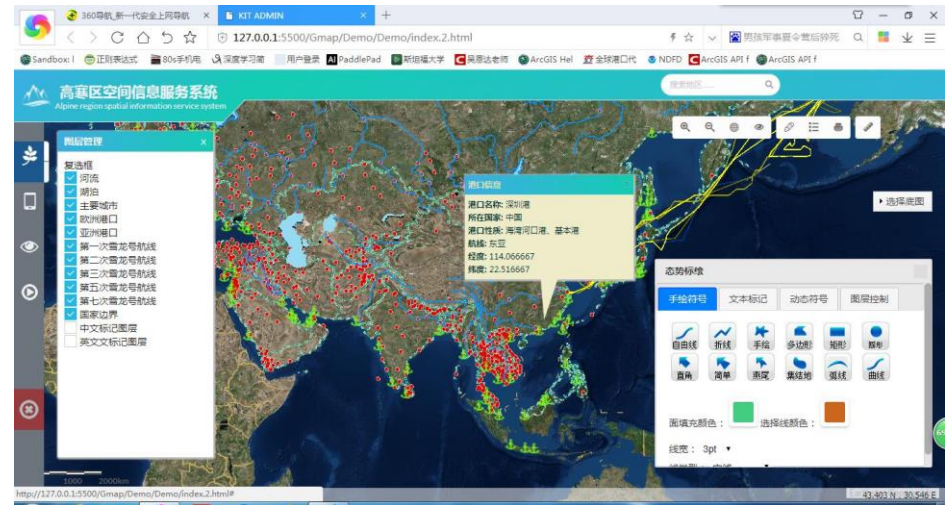
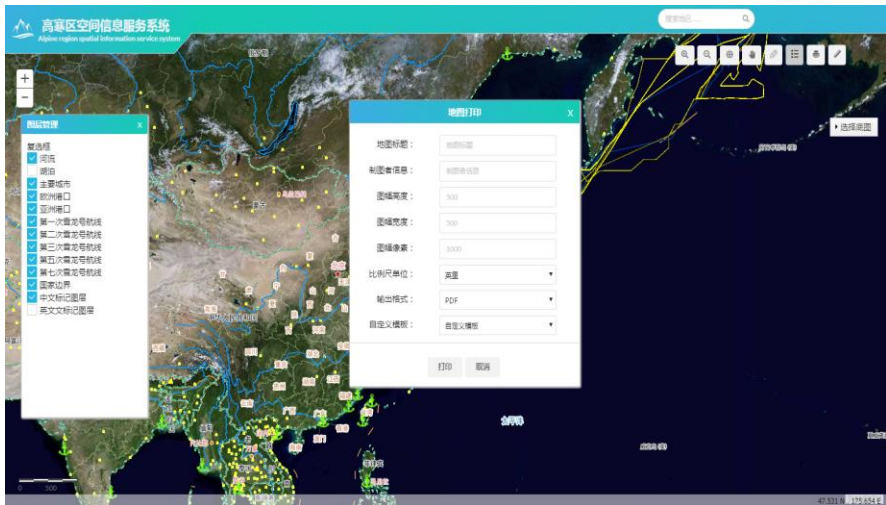
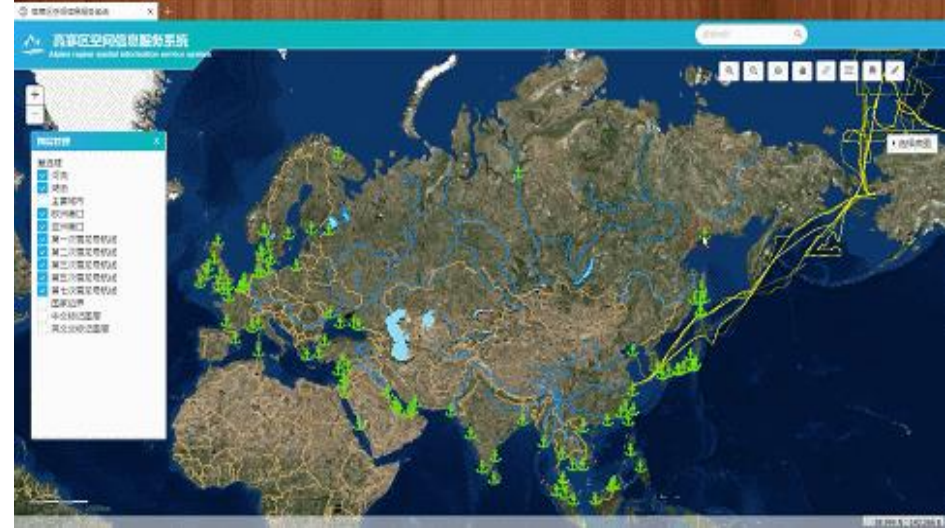
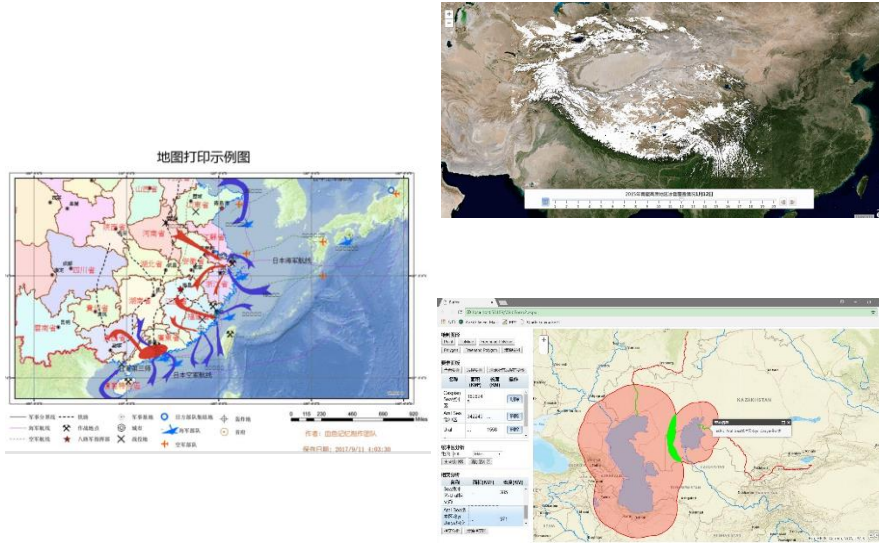
芬兰气象研究所北极研究中心 (FMI-ARC)



2018年10月16日 北京



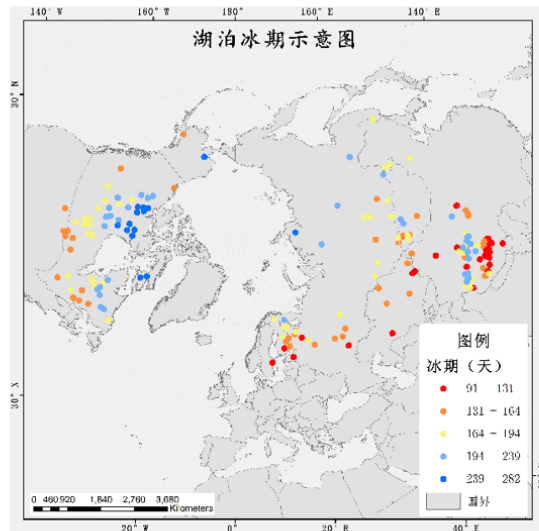
HiMAC : Information Service system



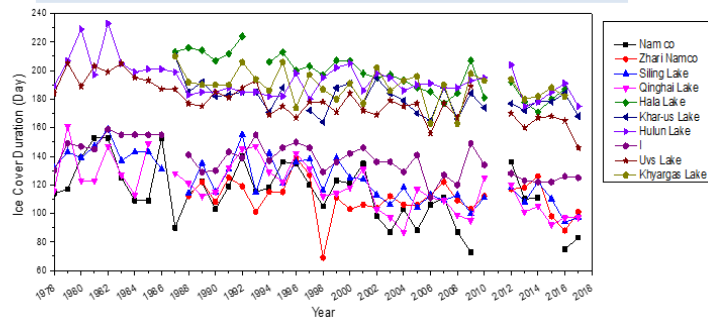
Big Earth Data Sub Package – Lake Ice, River Ice, and Sea Ice monitoring to HiAMC

湖冰物候监测结果：获取了三极区**210**个湖泊（含2002–2018年）湖冰物候数据集；其中含**10**个湖泊1978–2018年精细湖冰物候数据。

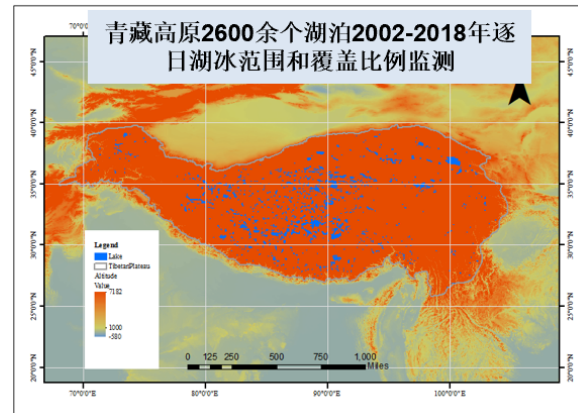
中大型湖泊冰期变化



青藏-蒙古高原10个湖泊1978-2018湖泊冰期

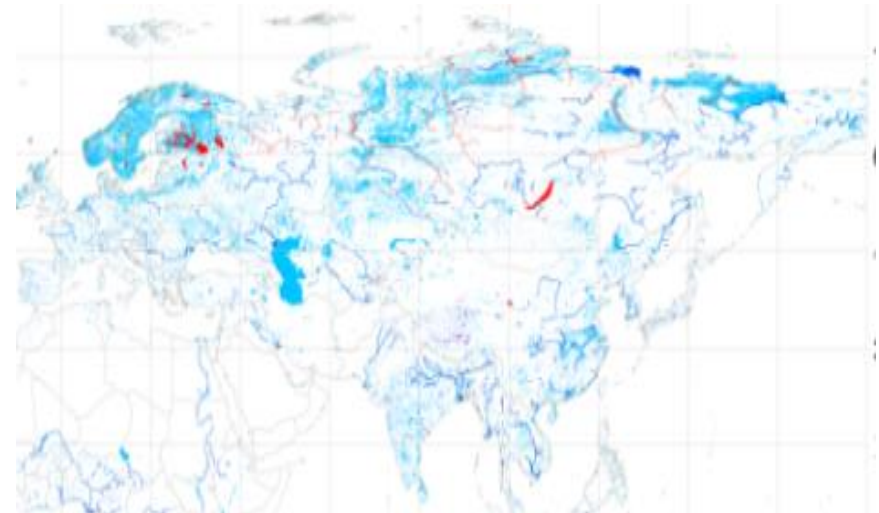
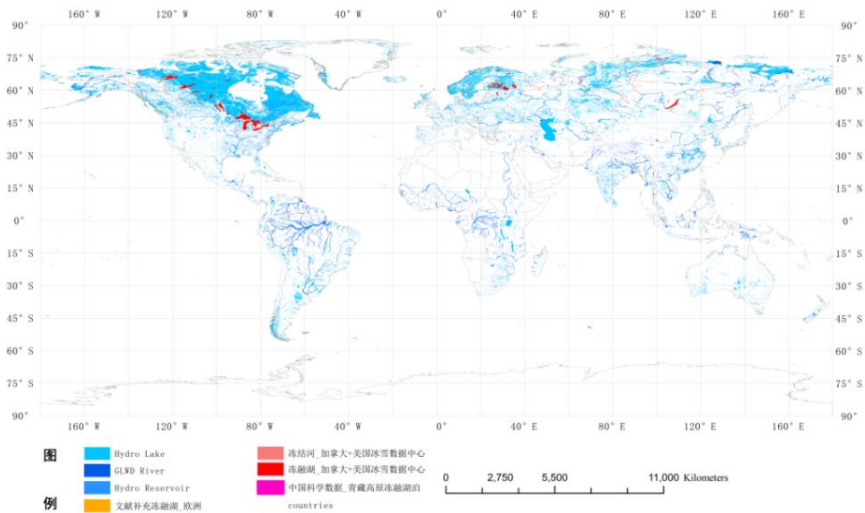


青藏高原2600余个湖泊2002-2018年逐日湖冰范围和覆盖比例监测



完成了高亚洲地区**2600**余个湖泊**5800**多天的物候产品数据集，撰写投稿Big Earth Data（Dataset for MODIS-based Daily Lake Ice Extent and Coverage over Tibetan Plateau, 2018）；

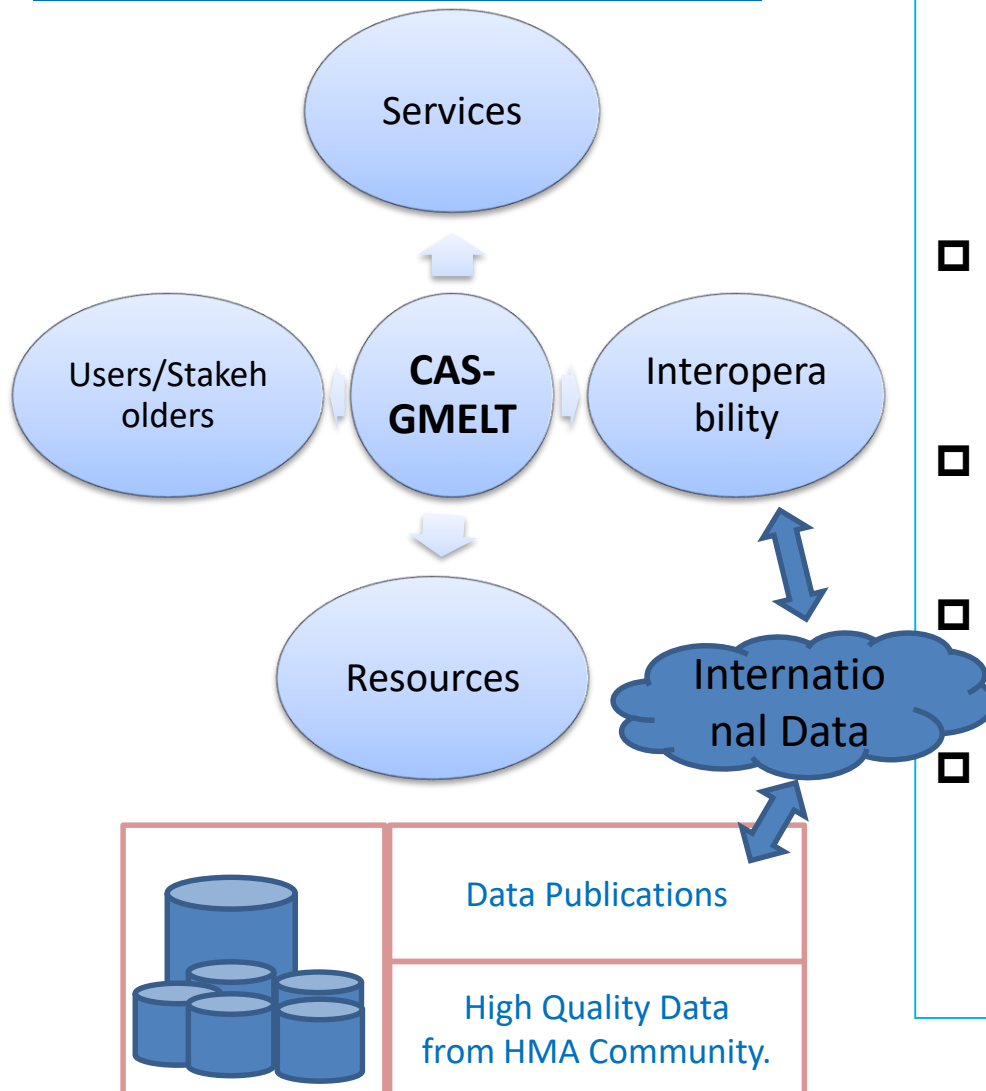
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CAS-GMELT : A HMA Community Portal



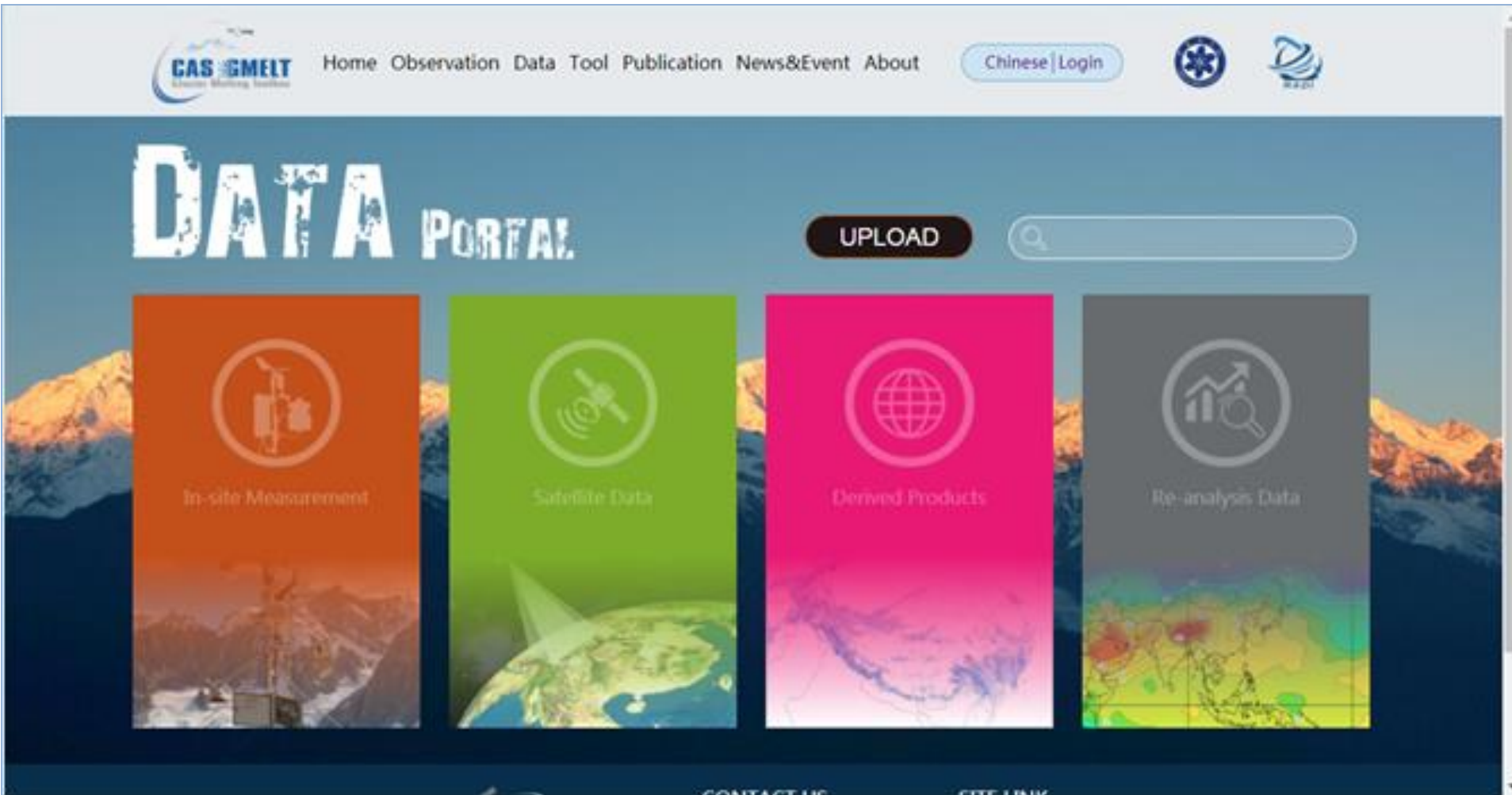
CAS-GMELT Functions



- ❑ **Data/Tools Resource**
 - Integrate both CAS-HiMAT and non-HiMAT resources (data, tools, algorithm)
 - Registration Service : Dialogue with the individual information providers.
 - Harvesting from public resources
- ❑ **Services**
 - Build specialized applications and components that provide value-added services within the HMA Communities.
- ❑ **Stakeholders/Users**
 - Externals can have access to its resources and services (humans or machines).
- ❑ **Interoperability**
 - Exchange with the international portals, especially the NASA-GMELT, BED ...
- ❑ **Portal Management**
 - Documents/Publications Services
 - User management system
 - English/Chinese version
 - ...

Design and Implementation of the GMELT

Data Portal: Website Elements



Data Portal: Data Portal for Users and Providers

Glacier ▲

Glacier Area

Glacier Elevation

Glacier Movement

Snow ▲

Snow Covered-Area

Snow Cover Fraction (SCF)

Snow Depth

Snow Water Equivalent

Lake ▲

Lake Area

Water Level

Lake Ice Phenology

Lake Ice Thickness

Vegetation ▲

Vegetation Fraction

Normalized Difference Vegetatio...

Vegetation Phenology

Precipitation ▲

Rain Rate

Extreme Rainfall

Temperature ▲

Land Surface Temperature

Air Temperature

Observation: Information Service and Data Viewer

Two folders:

- Data Statistic/Big Data
- Service (Glacier/Snow/Lake...)





Thank You

Contact details :

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